DEPARTMENT OF DEFENSE BLOGGERS ROUNDTABLE BRIEFER: COLONEL ROBERT VANDRE, RESEARCH AREA DIRECTOR FOR COMBAT CASUALTY CARE RESEARCH AT THE U.S. ARMY MEDICAL RESEARCH AND MATERIAL COMMAND SUBJECT: THE ARMED FORCES INSTITUTE OF REGENERATIVE MEDICINE AND THE COMBAT CASUALTY CARE RESEARCH MODERATOR: CHARLES "JACK" HOLT, CHIEF, NEW MEDIA OPERATIONS, OFFICE OF THE ASSISTANT SECRETARY OF DEFENSE PUBLIC AFFAIRS TIME: 11:30 A.M. EDT DATE: WEDNESDAY, MAY 7, 2008

(Note: Please refer to www.dod.mil for more information.)

COL. VANDRE: (In progress) -- a little bit of history; not a whole lot, but just a little.

I've been the research area director for Combat Casualty Care Research for the Army for almost 10 years. And over that time period, we've spent pretty much most of our budget on how to keep soldiers and other individuals alive after they've been wounded. And that's pretty much what we spend all of our money on. We have a little bit of money for putting people back together, but not very much. But we've gotten really pretty good about doing that. Right now, if you're wounded on the battlefield, you have a 50 percent greater chance of living than you did just in Vietnam, just 30 years ago. So we've really improved a ton since then. And so we're starting that, you know, we get all these soldiers that are getting wounded, and we're keeping them alive, but some of them are pretty seriously damaged and we're not able to put all the pieces back together again. And that's a very serious quality-of-life issue. And, of course, a lot of them can't stay on active duty.

Eighty-two percent of all of our wounded have extremity issues, and 30 percent have wounds to the face and the head. And then about 5, 6 percent have burns. And so we decided that these were areas that would be possible that maybe we could help to put them together and that the new field of tissue engineering and regenerative medicine would be the way to do that.

And so we went out and went to make this Armed Forces Institute of Regenerative Medicine and were able to -- well, the first thing I had to do was get funding, and I was able to get funding by going to virtually every federal agency I could that could possibly give money. So we do have funding now, not only from the Army, but we also have the Navy, the Air Force, the Veterans' Administration and the NIH. And I don't think, as far as anybody I've talked to ever has known, nobody has ever found a project where all of those agencies dealing with medical have ever funded a joint research project. So that's a first of its kind.

And we went out and asked for proposals and got it down to two, you know, consortia that were the very best ones. And out of those consortia, if you look at the -- there's a blog -- not a blog site but an FTP site that our

command has. And if you look on that FTP site, you can see all of the researchers there.

I was given a study commissioned by the NIH to look at the top regenerative medicine scientists in the U.S. and to list them by name. Actually, it was for the whole world. But out of the top ones in the U.S., we have seven of the 10 leading regenerative medicine scientists in our consortium. And there are 68 principal investigators spread over nearly 30 universities and companies within it. And so the idea is to use stem cells to be able to put people back together and to regrow the body parts that are damaged.

And it's really a dream team of people. We're putting in $85 million worth of DOD and NIH research. The two consortia are bringing an extra $80 million of research that they've generated by going to their states and their universities, so that's almost matching the amount we're putting in. And then since these scientists are all big- name people, they already have a lot of grants from NIH and the National Science Foundation and DARPA and other funding agencies, and that adds about another $100 million worth of research to the total equation. So it puts us at close to $50 million a year for research projects. So it's a very exciting project. And at that, I'll leave it -- I know you -- probably you've all been looking at some of this and probably know quite a bit, so I'll leave the rest up for your questions.

MR. HOLT: All right, sir, thank you very much.

And David, you were first on line, so why don't you get us started?

Q Yeah, sure.

Hey, I'd like to ask you about the -- I'm not sure if the institute is looking into the osteo-integration for prosthetic limbs. Has that happened?

COL. VANDRE: No, that's -- we're looking at regrowing -- we're looking at regenerating bone and regrowing -- we hope someday, like 20 years from now, to actually regrow a whole limb -- you know, no prosthetics.

Q Yeah, but there's an element of regenerative medicine -- (audio difficulty) -- isn't a big problem with that, but it's hard to keep the existing limb healthy when trying to plug a prosthetic onto it.

COL. VANDRE: Well, there's a different program that's funded essentially by congressional plus-ups that deals with advanced prosthetics. And there they are looking at osteo-integration of prosthetics. We're hoping to not need prosthetics.

So the near-term solution -- and DARPA has got a program in upper -- you know, lower limbs, the prosthetics for lower limbs are pretty good nowadays. I mean, there was a guy that ran the 400 meters, you know, fast enough that scientists felt he was getting an unfair advantage from his prosthetics and they won't let him compete in the Olympics. I don't know if you saw that. That was about three or four months ago.

Q Yeah.

COL. VANDRE: But the upper limbs, they stink. I mean, they almost -- they're only for looks. They don't do you any good, the upper prostheses. So DARPA has got a program there. And they're looking at possibly using a direct

neural stimulation to make the motors in the prostheses move; you know, actually having implants in the brain or in the terminal nerve trunks.

The problem with osteo-integration -- you know, I'm a dentist, so, I mean, we do osteo-integration all the time with -- you know, that's just part of our practice. But the real trick on osteo- integration on a limb -- and you can do it right now; I mean, we know how to do it in dentistry. We know how to do it in prosthetics. The problem is where that -- you know, you put this rod that's integrated into the bone, and that rod can, you know, then be strong. The problem is where that rod penetrates the skin. They tend to get retrograde infections. That's the real trick.

Q Okay, what's --

COL. VANDRE: Your mouth can solve that. (Laughs.)

Q Right. Well, so if lower body prostheses are doing fairly well, is your focus then on upper-limb regeneration?

COL. VANDRE: No. You know, they're almost -- they're essentially the same thing. If you can do one, you can do the other. And limb regeneration really isn't our focus for the first five years of this. It's really salvage. You know, there are some -- if you have a certain size defect in a limb, like maybe a big chunk of muscle is blown out or a big chunk of bone, or both, you can't really put it back together.

You know, especially on the lower, if you put it back together, the person is always limping and is always hurting forever when, if you just gave them a prosthesis, they'd be a lot better off kind of thing. And there are surgeons always going, "Do I cut this thing off or do I keep it?" And we're giving them some extra things that, you know, which will push the equation more towards "We can keep it because we can make it better." But the technologies could be used upper or lower limbs.

Q Okay. Well, I'll -- I'll let other folks follow up on that. Thanks.

MR. HOLT: Okay.

Mike.

Q Yes. I notice your focus seems to be primarily directed at stem cells. Are you doing any work with selective genetic expression or ECM, extracellular matrix?

COL. VANDRE: Oh, yes. You know Steve Badylak, the guy that did the finger on the old guy? Did you see that?

Q Yes.

COL. VANDRE: He put his finger in a propeller. Steve Badylak's a part of our consortium. And so, yeah, we are using extracellular matrices. There are about 12 projects within the AFIRM that we expect to go to clinical trials within the first five years, and extracellular matrix is one of the early kinds of things. We think that that'll, you know, help speed healing. And, of course, the reason it works so well is it's got a lot of these growth factors in

it. You know, it's got a sort of a soup of growth factors that help things grow.

Q Right. And I presume you all are also pursuing the signaling capabilities in the ECM as well, not just, as you call it, the growth suit there.

COL. VANDRE: Right. But, you know, we're using those signaling capabilities and also the stem cells signaling capabilities too. You know, there's different -- stem cells have different -- you know, there's different stem cells, you know. We're pretty much going with autologous, you know, so you're using your own stem cells, because we wanted to get things into patients fastest.

And using your own stem cells gets rid of the rejection problem, and plus adult stem cells are more tame. They don't tend to form tumors or cancers, whereas fetal stem cells cause cancer and tumors. So we've pretty much stayed away -- of course, those are also politically things that sometimes you don't want to -- some of those fetal stem cells you can't even invest in right now because of the law.

Q Right.

COL. VANDRE: But, yeah, we are looking at a range of those. I think that the extracellular matrix is probably one of the low-hanging fruit areas, you know, that should be able to come to fruition fairly early.

MR. HOLT: Okay. And Grim?

Q Yes. You mentioned direct neurostimulation of prosthetics. I know a fellow who just got a prosthetic leg that is computer- assisted to make his walking more natural-seeming. I was wondering if there's any progress in integrating how you translate neurosignals into information that prosthetics and computers can use, that talk back and forth to each other so that you can -- again, not just to control them, but to get feedback as well. Can you talk about that for a while?

COL. VANDRE: That is part of the DARPA program, to have, you know -- DARPA's pretty much only working on the upper limb, because that's where you really need that. And, of course, you know, when you grab something, if you grab too hard -- some things, if you grab too hard, like an egg, you'll break it, whereas other things, like a hammer, you can't, obviously. And so you have to have that feedback. And that is a part of the DARPA program.

Q All right, thank you.

MR. HOLT: Okay. Any other questions? Any follow-ups?

Q One follow-up. A few years back, NASA had a commercial space center that was doing some advanced research with bone replacement materials, including some that provided a scaffold, in essence, for the body to rebuild itself. Are you all following up with that research or with that commercial space center at the Colorado School of Mines?

COL. VANDRE: I'm not sure about that one itself. But tissue engineering, which is, you know, one of the -- what do you call it? -- one of

the building blocks of regenerative medicine and which is one of the major research thrusts, its essential premise is that it uses a scaffold.

So, say, you want to make -- like Dr. Atala, he already had this in Nature Magazine a while back with bladders. And this was what actually got us interested in doing the AFIRM project was, you know, I always thought, well, you know, 50 years from now we'll have all of this stuff, you know, a lot of what you see in the science fiction movies, but, you know, it's not going to happen in my tenure. But Atala reported at our meeting on bladders -- and there are people that are born with essentially no bladder, and it's, you know, a very debilitating thing to have to live with a sac, you know, outside your abdomen filling up with urine all the time and having to drain it. You know, it's a pretty crummy way to live.

And so they actually made these biodegradable bladders that are about the size of a baseball, same size as your bladder, and they took stem cells from the actual patients and grew them in tissue cultures so that some were grown as urothelial cells, which are the kind of cells that go on the inside of a bladder, and then some are also grown as muscle cells would go on the outside of the bladder.

You know, your muscle has -- your bladder has the ability to contract, and that's what squirts the urine out and that pressure from the contraction. And so he put a biodegradable scaffold that he painted these muscle cells on the outside and the urothelial cells on the inside, and he put those inside of, I don't know, like, 10 patients, something like that.

And then what happened was, over a period of months, the scaffold dissolved. They were biodegradable scaffolds. And as they dissolved, of course, the stem cells were growing. And so, by the end of about six months, the actual scaffold wasn't there anymore. But what it did was it made the muscle and the urothelial cells grow in the shape of a bladder so that they had in the right parts, where the right cells are on the inside and the right cells are on the outside. And those patients, after about six months, could actually feel that they had to go. And when they peed, it squirted, you know. At first -- you know, of course, there's no squirting, and you have to have a catheter at first because there's no muscles to contract.

So that's essentially -- we have a bunch of bone regrowth, and pretty much all of the bone regrowth protocols we have use scaffolds. But whether they use the ones from Colorado, I'm not sure. But there's probably five or six bone regrowth proposals in there that we'll be working on with scaffolds.

Q Okay.

MR. HOLT: All right. Anything else?

Q Yeah. Hey, it's David again. I'm sorry I never introduced myself. I'm David Axe with the War Is Boring blog.

So what's your institute doing that nobody else is?

COL. VANDRE: Well, you know, that's a good -- nobody's asked me that one, but that's a really good question. The NIH spends about $500 million a year on tissue engineering research and stem cells and growth factors, how to signal things and make them grow in certain ways, how to -- you know, if you get a stem cell, how do you make it turn from a cell that could be anything into

what you want it to be, you know. And so they're spending hundreds of millions of dollars on that, but it's all pretty much basic research with cell lines, you know, and all this stuff, and they get a lot of papers out of it.

But the thing that was missing that we add is the part to actually translate it from basic research actually into people. And that's where, you know, there's not much money in that area. But, you know, to really get any of these basic research technologies into people, you have to -- you know, in science and technology, they call it the valley of death. You have all these things that you work on in the lab. And out of 100 things you work on in the lab, one gets into -- you know, actually becomes a product, because there's this valley of death. There's no funding to bridge the gap. And that's what we're doing is bridging that gap. So that's where we're different from anybody else.

This is the biggest -- as far as I know, this is the biggest consortium in this area in the world. It's for sure the biggest one in the United States. There's not anything within an order of -- maybe the next closest thing is an order of magnitude smaller.

Q So could you maybe provide some of the basic numbers for me? How many -- you've already discussed money, but how many total projects you have and how many folks do you work with?

COL. VANDRE: Okay. We have -- as I recall, there are 68 principal investigators, and all of them have probably one or two post-docs. So those are Ph.Ds that are just out of their programs, and maybe one or two technicians.

So you're talking total scientists and technicians, about 250. And they're spread over about 30 organizations.

If you look on the FTP site -- I don't know if you have the coordinates for that -- but that'd be worth looking at. You can download all of the universities. It's a who's who. I mean, when you look at it and look at the names of the people and look up their publications, this is the cream of the crop.

Q What's the site?

COL. VANDRE: I'll have to look it up, to tell you the truth. Hold on a sec.

Q Would it be easier just to e-mail everybody?

MR. HOLT: Yeah, why don't -- you can -- I can -- if you can get that to Lindy or to me, and then I'll get it out to those on the call.

COL. VANDRE: Okay.

MR. HOLT: All right?

COL. VANDRE: Yeah, I'll do that, because we set it up when we had the press conference a few weeks ago. And it's really cool, because it has -- it's essentially a press packet. It's got two documents, one done by Wake Forest and the other one done by Rutgers. And both of them talk about technologies their teams are working with, lots of real high-quality color pictures and the explanations and on who's doing what. So that's really kind of interesting.

There's a frequently-asked-questions file. And then there's one file that's a spreadsheet that has all the principal investigators and all their universities. It's -- when you see it, I think you'll be impressed. You know, I really think that -- and I'm supposed to manage this whole thing, and I really feel that the biggest challenge is going to be that pretty much most of these researchers are the big dog. You know, they're the main person at their schools. They get all this money. They have plenty of money already. They have plenty of research assistants and post-docs. They have large resumes. They're used to calling the shots. And now they have to work as a team. (Laughs.) So this is herding cats (major ?). And it'll be very interesting.
MR. HOLT: All right. Okay, anybody else? Anything else?

Well, all right --

Q Wait. I mean, if nobody else is going to jump in, we've still got 10 minutes, don't we?

COL. VANDRE: We have plenty of time.

Q Okay, good. This is David again.

So can you walk me through -- you talk about some of this low- hanging fruit. I want to try to -- I want to be able to imagine how one of the near-term projects might play out. So, I mean, how do you assign projects to the principal investigators? How do you shepherd them from, you know, across this valley of death you talked about? How long does it take? And when do we see it working with actual people?

COL. VANDRE: Well, yeah. Some of this -- pretty much the two consortia put in their proposals and had all that worked out. We required them to have product development plans for all of their technologies and actually commercialization plans for everything as well. The Wake Forest proposal was 860 pages, and the one from Rutgers was 640 pages; so, I mean, a tremendous amount of detail in there.

And they have things that are already gone through, inpatients that we're looking at, new kinds of skin, synthetic -- well, it's engineered skin, so it's using real persons' cells and everything. So we've got that that's pretty near term. And then there's other things that are far out.

There's some -- you probably saw the picture of the patient that -- I don't know if you saw the picture from the news conference, the soldier that had the -- or the Marine that had the 40 operations. Did you see that one?

Q Yeah.

COL. VANDRE: Yeah. He's missing ears and the end of his nose. And, of course, that's -- we really expect to be able to do something about that in a couple of years, you know, because that's -- you saw the picture with the mouse with the ear on his back. And that technology just needs -- I mean, essentially we've just got to refine it a little bit more, and we should be able to give it a go. So there's just varying levels we have.

We're actually right now using extracellular matrix to try to regrow damaged muscles, you know, places where a person's got, say, a wound right in the middle of a muscle and he's missing the middle third or something, and to grow the two ends back together, which you can't do right now using just

cellular matrix and a filler. So we have things all the way along the development process.

Q Quick follow-up, if I may, on that, using the ECM. I'm presuming that you all are already looking at products on the market, ECM products like SIS?

COL. VANDRE: Yes.

Q Okay.

COL. VANDRE: Yep. That's -- that was essentially Badylak's first product, I think. We also have some interesting technological -- we're using an inkjet printer. They've modified inkjet printers to squirt our cells, and they naturally print in three dimensions cells on objects so you get different layers. You know, you might have -- like skin has dermis on the bottom and epithelial cells on the top, and then it has blood vessels in the middle.

So you could actually paint a dermal layer, then, you know, paint some blood vessels in there with endothelial cells and then paint some -- so, you know, you do these different kinds of things, and they've actually done, like, little hearts, you know, and stuff, animal-size hearts. You know, there's a lot of interesting technologies. They have pictures of all that. It's all on the FTP site.

MR. HOLT: Okay. All right. David, anything else?

Q Yeah, yeah. Just one more thing. You know, for follow- ups, would you mind -- Jack, can we get the colonel's e-mail address so we can talk directly?

MR. HOLT: Okay, sure. Yeah, we can --

COL. VANDRE: Fine with me.

MR. HOLT: I'll get you all connected here.

Q Okay, great.

COL. VANDRE: Yeah, I'm happy to do that. I think, you know, I'm just very excited about all this, as you can tell. I just can't wait till we can start, you know, using this on some patients and helping them out. It's what I've been wanting to do for so long.

MR. HOLT: Well, all right, sir. Okay, sir. Well, we will get contact information back and forth, get everybody hooked up and connected, and the FTP site address. And we'll get that passed around. And hopefully, sir, we can speak with you again on this in a few months and see how things are going.

COL. VANDRE: That sounds great. MR. HOLT: All right, sir. Well, I'd like to thank you for joining us here on the Bloggers Roundtable today.

Colonel Robert Vandre is the research area director for Combat Casualty Care Research at the U.S. Army Medical Research and Material Command.

Thank you, sir, for joining us today.

COL. VANDRE: You're welcome.

MR. HOLT: All right. Thank you, sir.

END.